

## **General Description**

The GreenMOS<sup>®</sup>

**Absolute Maximum Ratings** at  $T_j=25^\circ\text{C}$  unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-source voltage	$V_{DS}$	550	V
Gate-source voltage	$V_{GS}$	$\pm 30$	V
Continuous drain current <sup>1)</sup> , $T_C=25^\circ\text{C}$	$I_D$	20	A
Continuous drain current <sup>1)</sup> , $T_C=100^\circ\text{C}$		12.5	
Pulsed drain current <sup>2)</sup> , $T_C=25^\circ\text{C}$	$I_{D, pulse}$	60	A
Continuous diode forward current <sup>1)</sup> , $T_C=25^\circ\text{C}$	$I_S$	20	A
Diode pulsed current <sup>2)</sup> , $T_C=25^\circ\text{C}$	$I_{S, pulse}$	60	A
Power dissipation <sup>3)</sup> , $T_C=25^\circ\text{C}$	$P_D$	104	W
Single pulsed avalanche energy <sup>5)</sup>	$E_{AS}$	200	mJ
MOSFET dv/dt ruggedness, $V_{DS}=0\dots 480\text{ V}$	dv/dt	50	V/ns
Reverse diode dv/dt, $V_{DS}=0\dots 480\text{ V}$ , $I_{SD} = I_D$	dv/dt	15	V/ns
Operation and storage temperature	$T_{stg}, T_j$	-55 to 150	$^\circ\text{C}$

**Thermal Characteristics**

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case	$R_{JC}$	1.20	$^\circ\text{C/W}$
Thermal resistance, junction-ambient <sup>4)</sup>	$R_{JA}$	62	$^\circ\text{C/W}$

**Electrical Characteristics** at  $T_j=25^\circ\text{C}$  unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	$BV_{DSS}$	550			V	$V_{GS}=0\text{ V}$ , $I_D=250\text{ }\mu\text{A}$
		600				$V_{GS}=0\text{ V}$ , $I_D=250\text{ }\mu\text{A}$ , $T_j=150^\circ\text{C}$
Gate threshold voltage	$V_{GS(th)}$	2.7		3.7	V	$V_{DS}=V_{GS}$ , $I_D=250\text{ }\mu\text{A}$
Drain-source on-state resistance	$R_{DS(ON)}$		0.15	0.19		$V_{GS}=10\text{ V}$ , $I_D=10\text{ A}$
			0.37			$V_{GS}=10\text{ V}$ , $I_D=10\text{ A}$ , $T_j=150^\circ\text{C}$
Gate-source leakage current	$I_{GSS}$			100	nA	$V_{GS}=30\text{ V}$
				-100		$V_{GS}=-30\text{ V}$
Drain-source leakage current	$I_{DSS}$			1	$\mu\text{A}$	$V_{DS}=550\text{ V}$ , $V_{GS}=0\text{ V}$

### Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	$C_{iss}$		991.4		pF	$V_{GS}=0\text{ V}$ , $V_{DS}=50\text{ V}$ , $f=100\text{ kHz}$
Output capacitance	$C_{oss}$		125.9		pF	
Reverse transfer capacitance	$C_{rss}$		2.7		pF	
Turn-on delay time	$t_{d(on)}$		22		ns	$V_{GS}=10\text{ V}$ , $V_{DS}=400\text{ V}$ , $R_G=2\ \Omega$ , $I_D=10\text{ A}$
Rise time	$t_r$		6.7		ns	
Turn-off delay time	$t_{d(off)}$		36.1		ns	
Fall time	$t_f$		3.5		ns	

### Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	$Q_g$		17.7		nC	$V_{GS}=10\text{ V}$ , $V_{DS}=400\text{ V}$ , $I_D=10\text{ A}$
Gate-source charge	$Q_{gs}$		4		nC	
Gate-drain charge	$Q_{gd}$		7.2		nC	
Gate plateau voltage	$V_{plateau}$		5.7		V	

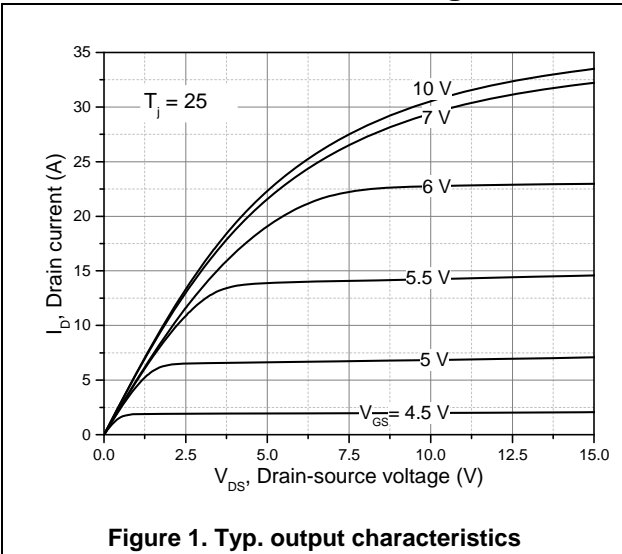
### Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	$V_{SD}$			1.3	V	$I_S=20\text{ A}$ , $V_{GS}=0\text{ V}$
Reverse recovery time	$t_{rr}$		237.7		ns	$V_R=400\text{ V}$ , $I_S=10\text{ A}$ , $di/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	$Q_{rr}$		2.6		$\mu\text{C}$	
Peak reverse recovery current	$I_{rrm}$		21.1		A	

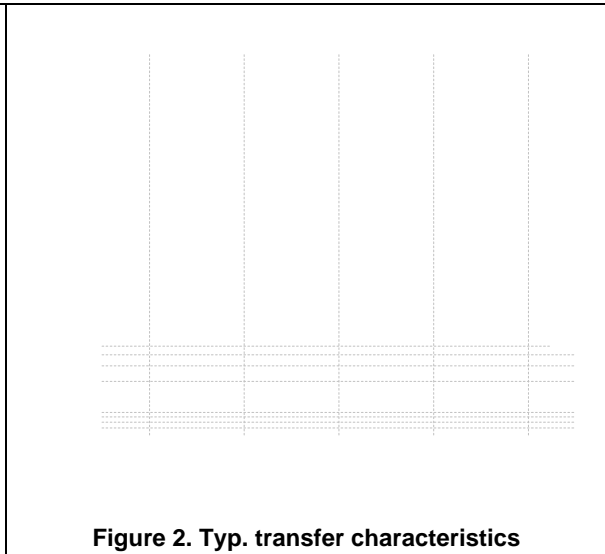
#### Note

- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating; pulse width limited by max. junction temperature.
- 3)  $P_d$  is based on max. junction temperature.  $P_d = I_D \times V_{DS} \times \theta_{JA} \times T_{max} - T_{amb}$

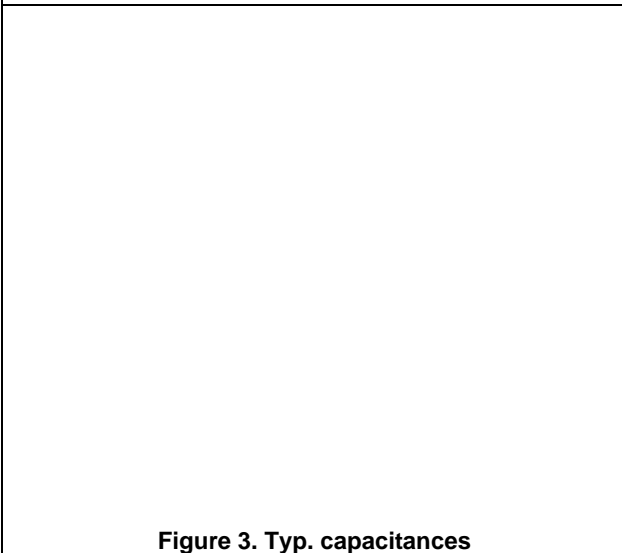
**Electrical Characteristics Diagrams**



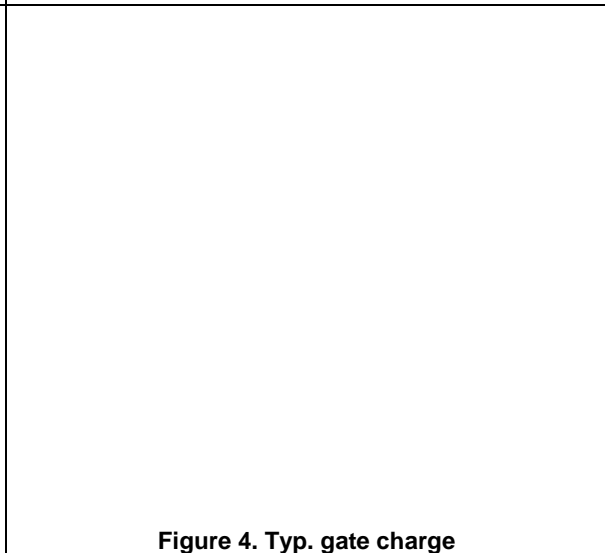
**Figure 1. Typ. output characteristics**



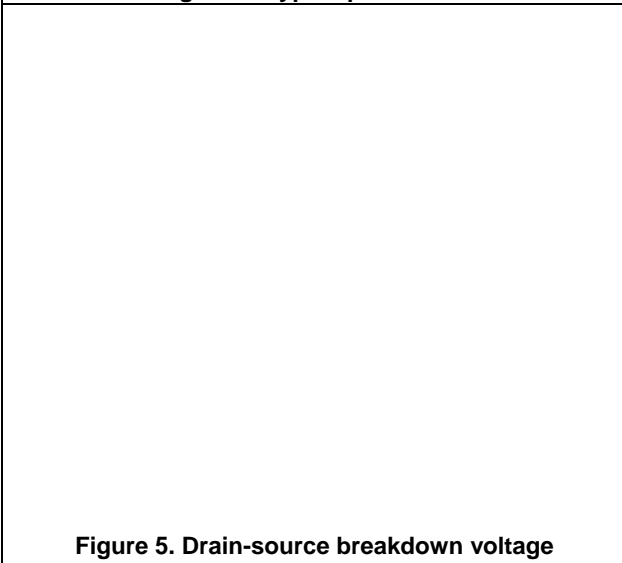
**Figure 2. Typ. transfer characteristics**



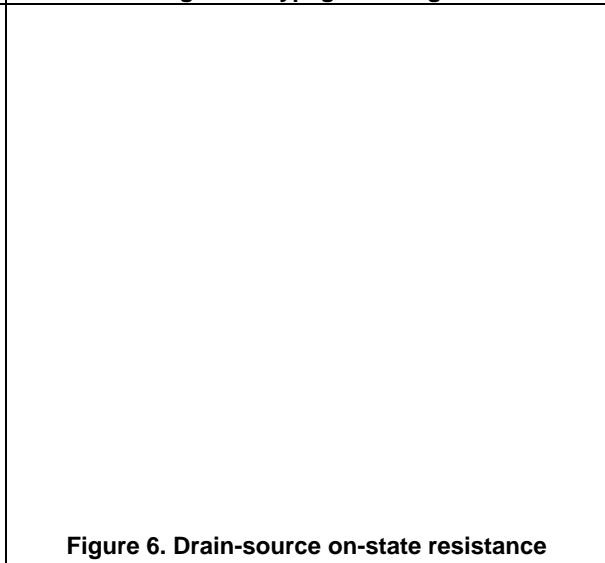
**Figure 3. Typ. capacitances**



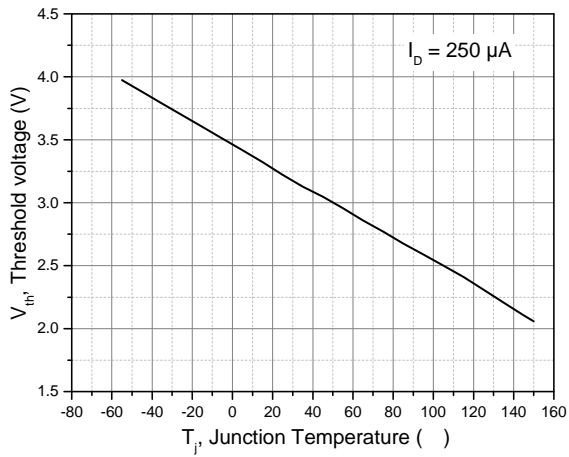
**Figure 4. Typ. gate charge**



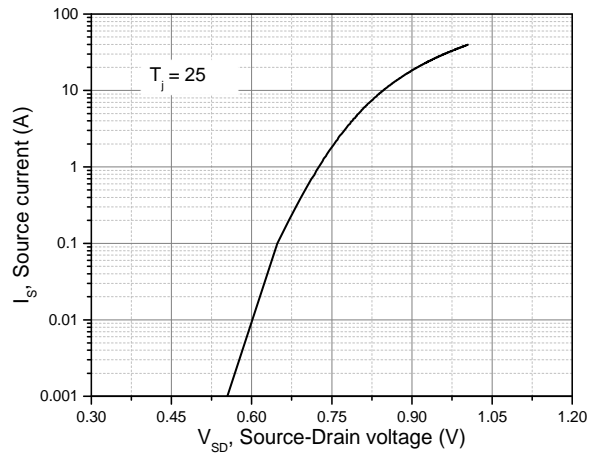
**Figure 5. Drain-source breakdown voltage**



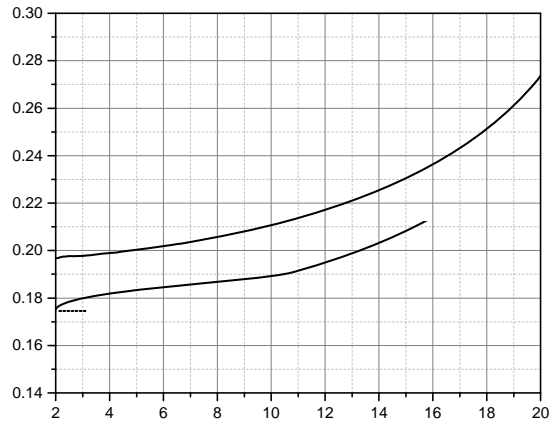
**Figure 6. Drain-source on-state resistance**



**Figure 7. Threshold voltage**



**Figure 8. Forward characteristic of body diode**

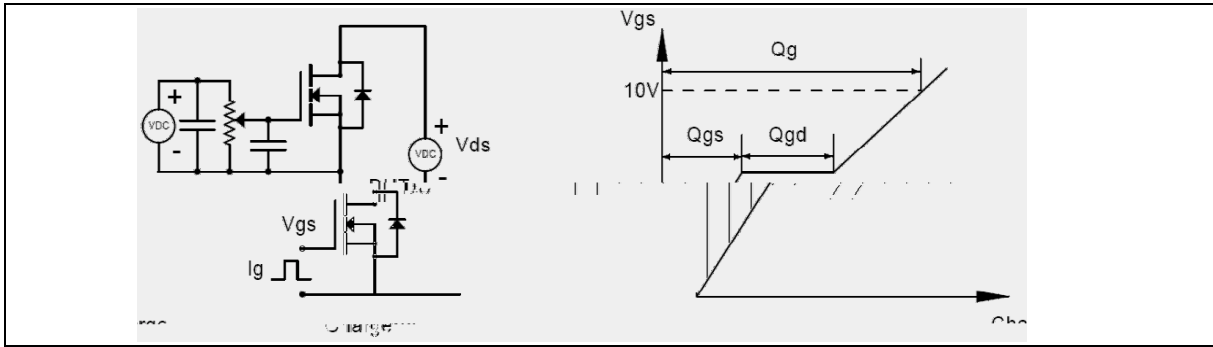


**Figure 9. Drain-source on-state resistance**

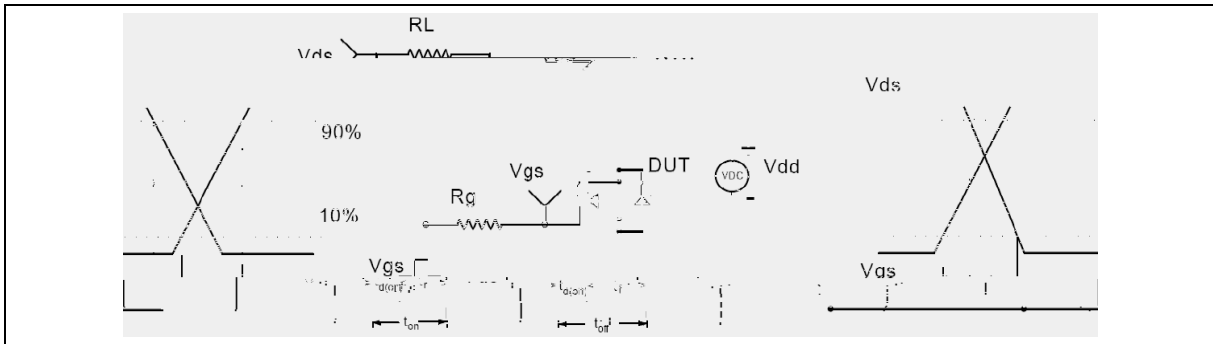
**Figure 10. Drain current**

**Figure 11. Safe operation area Tc=25 °C**

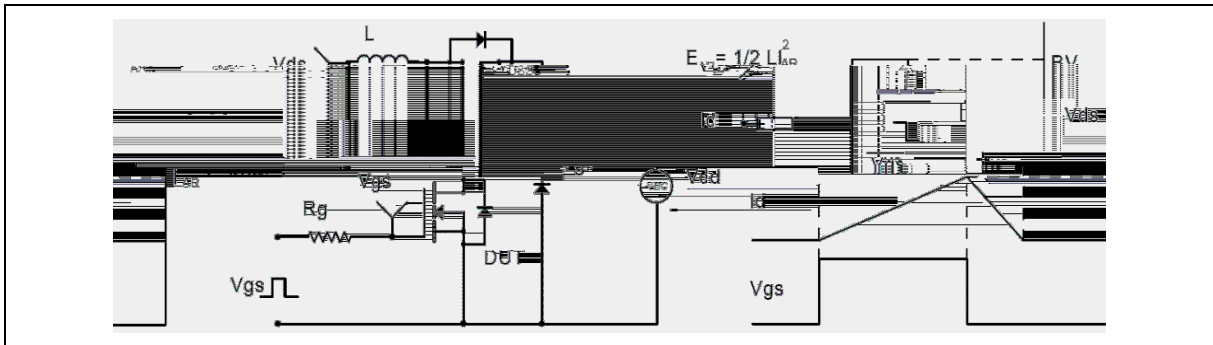
**Test circuits and waveforms**



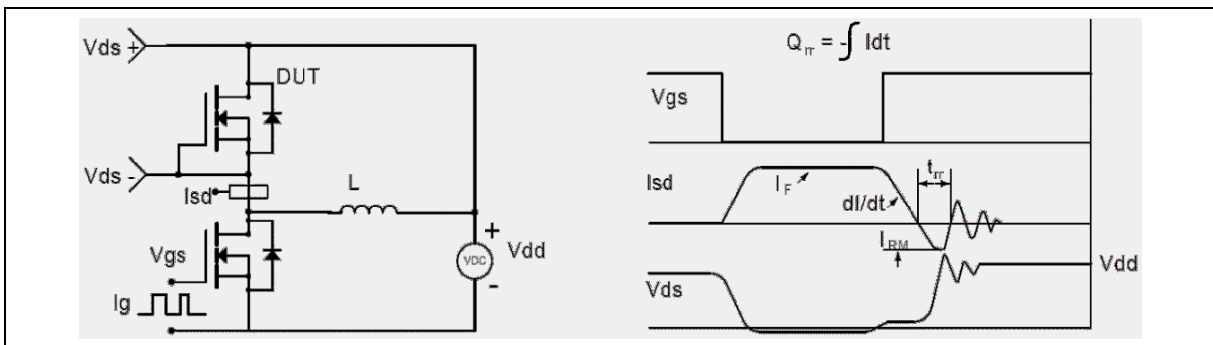
**Figure 1. Gate charge test circuit & waveform**



**Figure 2. Switching time test circuit & waveforms**

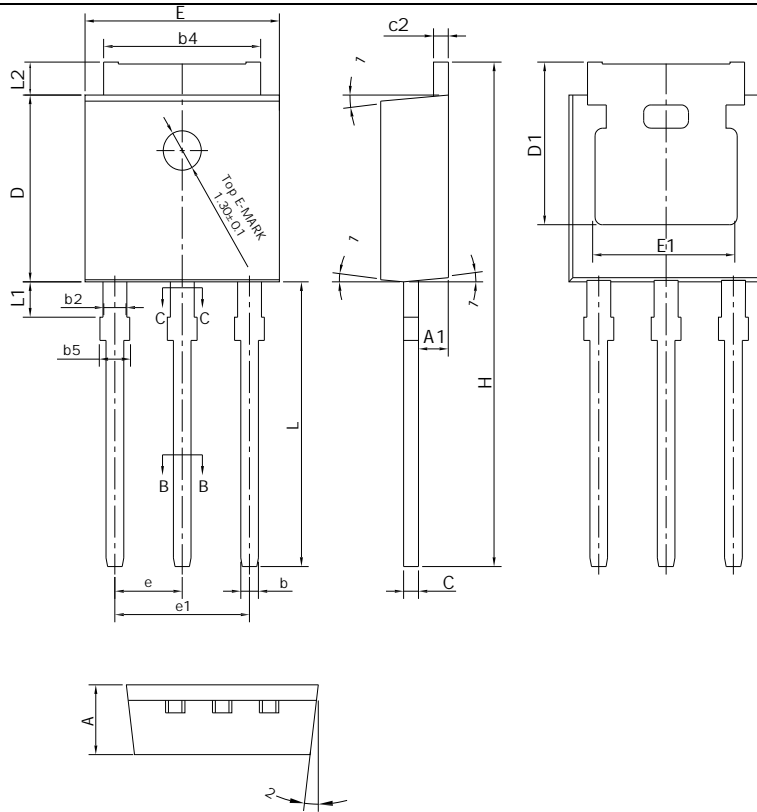


**Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms**



**Figure 4. Diode reverse recovery test circuit & waveforms**

**Package Information**



Symbol	mm		
	Min	Nom	Max
A	2.20	2.30	2.35
A1	0.90	1.01	1.10
b	0.56	-	0.69
b1	0.55	0.60	0.65
b2	0.77	-	0.90
b3	0.76	0.81	0.86
b4	5.23	5.33	5.43
b5	-	-	1.05
c	0.46	-	0.59
c1	0.45	0.51	0.55
c2	0.46	-	0.59
D	6.00	6.10	6.20
D1	5.20	-	-
E	6.50	6.60	6.70
E1	4.60	4.83	5.00
e	2.24	2.29	2.34
e1	4.47	4.57	4.67
H	16.18	16.48	16.78
L	9.00	9.30	9.60
L1	0.95	1.16	1.35
L2	0.90	1.08	1.25
1	3°	5°	7°
2	1°	3°	5°

Version 1: TO251-J package outline dimension

## Ordering Information

Package Type	Units/ Reel	Reels / Inner Box	Units/ Inner Box	Inner Box/ Carton Box	Units/ Carton Box
TO251-J	75	60	4500	5	22500

## Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSG55R190AF	TO251	yes	yes	yes

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